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In re Application of:

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Application No.:	Unassigned	Art Unit: Unassigned
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For:	NON-CIRCULAR, FLAT MOTOR AND MANUFACTURING METHOD THEREOF	

SPECIFICATION, CLAIMS AND ABSTRACT AS PRELIMINARILY AMENDED

Amendments to the paragraph beginning at page 1, line 4:

The present invention relates to a flat motor used as a silent ~~alarming~~ alarm source in a mobile communications apparatus, and more particularly, to a non-circular, flat motor in which terminal portions are installed ~~at~~ in dead space.

Amendments to the paragraph beginning at page 1, line 12:

A conventional cylinder type vibration motor having a diameter of 4 mm is currently being widely used. However, since the vibration motor ~~should be~~ is mounted ~~by~~ using a holder, the actual diameter thereof becomes 5 mm, which ~~does~~ has not ~~keep~~ kept pace with the ongoing trend ~~to miniaturize~~ in miniaturizing portable ~~apparatuses~~ apparatus. Furthermore, the vibration motor is ~~of~~ a narrow cylinder ~~type~~ so that sufficient space in a radial direction for an eccentric weight installed at an output shaft cannot be secured, resulting in weak vibrations. In comparison, a flat motor having a thickness of 3 mm can be easily obtained. Also, a large space in a radial direction can be obtained. The conventional flat vibration motor is shown in FIG. 12.

mm can be easily obtained. Also, a large space in a radial direction can be obtained. The conventional flat vibration motor is shown in FIG. 12.

Amendments to the paragraph beginning at page 2, line 1:

With a recent trend in ~~a~~ small and light mobile communication apparatus, electric parts mounted thereon ~~becomes~~ must be small and light and there is a need for parts that can be reflow soldered, a type of soldering used in ~~the~~ automation of an assembly process. However, in the case of an apparatus using an electric part having a magnet, such as the flat motor, the magnet thermally deteriorates due to ~~a~~ the high temperature during ~~a~~ the process of reflow soldering. Also, it is difficult to hold the conventional motor, which is circular when viewed in a plane, with a transferring apparatus and the flexible sheet is very likely to be damaged when it is automatically mounted.

Amendments to the paragraph beginning at page 5, line 25:

FIG. 2 is a sectional view of a brushless type non-circular flat vibration motor according to a preferred embodiment of the present invention, taken along line ~~I-II~~ II-II of FIG. 1;

Amendments to the paragraph beginning at page 6, line 3:

FIG. 5B is a side view of the motor of FIG. 5A ~~viewing~~ viewed from the side indicated by arrow A;

Amendments to the paragraph beginning at page 6, line 7:

FIG. 6B is a side view of the motor of FIG. 6A ~~viewing~~ viewed from the side indicated by arrow B;

Amendments to the paragraph beginning at page 6, line 11:

FIG. 8 is a cross sectional view of the coreless type non-circular flat vibration motor of FIG. 7 taken along line ~~III-IV~~ VIII-VIII of FIG. 7;

Amendments to the paragraph beginning at page 7, line 12:

FIG. 2 shows a cross section of a square-shaped, axially ~~gaped~~gapped, brushless type flat motor, taken along line~~I-II~~ II-II of FIG. 1. That is, a shaft core 1a protrudes from the center of a metal stator~~baser~~ base 1 to which a printed circuit board is attached, and the shaft core 1a is coated with slippery resin to form a resin coated, fixed shaft 1S. A core holder 2 is integrally formed of the same resin~~to be~~ slightly further out in the axial direction from the resin coated, fixed shaft 1S. A stator core 4 made by winding an armature coil 3 around a plurality of salient poles is welded to the core holder 2.

Amendments to existing claims:

1. (Amended) A non-circular flat motor comprising:

a rotor rotating about an axis aligned in an axial direction;

a housing~~formed to be~~ which is non-circular~~when viewed~~ in a plane perpendicular to the axial direction, which~~rotatabley~~ rotatably supports the rotor, and which has side surfaces, at least a part of~~side surfaces being a~~ which are flat~~surface~~; and

a plurality of feeder terminals arranged~~at an angled corner~~ at the side surface at corners of the housing~~which is formed by~~ and electrically~~insulating all terminals of high electric potential~~ insulated from~~other~~ adjacent portions~~adjacent thereto~~ of the motor.

2. (Amended) The motor as claimed in claim 1, wherein the housing includes a stator base and including an armature coil~~is~~ arranged at~~a~~ the stator base~~functioning as part of the housing~~, and a magnet facing the armature coil~~is arranged at~~ and disposed on the rotor.

3. (Amended) The motor as claimed in claim 2, wherein the housing is substantially rectangular ~~when viewed~~ in ~~a~~ the plane and at least some of the feeder terminals ~~are formed~~ do not ~~to~~ protrude outward ~~over the angled corner as an angled portion for installation~~ beyond sides of the housing.

4. (Amended) The motor as claimed in claim 1, further comprising a flat magnet, a bracket as part of the housing ~~where~~ and on which the magnet is ~~arranged~~ disposed, a brush ~~incorporated with~~ connected to the feeder terminals ~~via~~ across a first gap between the bracket and the magnet, wherein the rotor receives electric power via the brush and faces the flat magnet ~~via~~ across a second gap in ~~an~~ the axial direction.

5. (Amended) The motor as claimed in claim 4, wherein a base end ~~portion~~ of the brush is ~~formed as~~ part of the feeder terminal ~~as it is~~.

6. (Amended) The motor as claimed in claim 4, wherein the housing is substantially rectangular ~~when viewed~~ in ~~a~~ the plane and at least some of the feeder terminals ~~are formed~~ do not ~~to~~ protrude outward ~~over~~ beyond the ~~angled corner as an installation portion~~ corners of the housing.

7. (Amended) A non-circular flat motor comprising:

a rotor rotating about an axis aligned in an axial direction;

a housing including a stator base having a shaft for supporting the rotor ~~provided at the center thereof and~~ centrally located on the stator base, the housing having a non-circular shape ~~when viewed~~ in a plane perpendicular to the axial direction, ~~at least some portion of the housing~~ and being ~~formed of~~ at least partially a resin; and

at least two feeder terminals arranged at ~~an angled~~ a corner ~~at the~~ of the housing on a side surface of the housing ~~which is formed by~~, electrically insulating ~~all~~ the feeder terminals ~~of high electric potential~~ from ~~other~~ adjacent portions ~~adjacent thereto~~of the motor.

8. (Amended) The motor as claimed in claim 7, wherein the shaft ~~is installed by erecting~~ has a fixed shaft core extending from ~~one~~ a portion of the housing constituting a stator ~~and coating~~, the shaft core ~~with resin to form~~ having a resin ~~coated, fixed shaft~~coating, ~~and~~ the rotor is rotatably installed ~~from a tip of~~ on the resin coated~~,~~ fixed shaft, and ~~the~~ a tip of the shaft is inserted in a concave portion ~~installed at another portion~~ of the housing.

9. (Amended) The motor as claimed in claim 8, further comprising:

a magnetic yoke plate ~~formed of a magnetic body and having~~, the shaft core integrally protruding from the center ~~thereof~~of the magnetic yoke plate, constituting part of the housing;

a commutator;

a resin bracket including the resin coated, fixed shaft wherein the rotor includes the commutator;

a pair of brushes having ~~a~~ free ~~end~~ ends in sliding contact with the commutator and fixed such that at least two surfaces can expose base ends of the resin bracket portion through ~~the~~ a brush recess portion;

~~a resin bracket portion which includes a resin coated, fixed shaft made by incorporating in the resin bracket portion at least part of the yoke plate and coating the shaft core with resin; a rotor including a commutator;~~ and

an armature coil having one end ~~portion~~ connected to the commutator and rotatably arranged at the resin coated, fixed shaft ~~to face~~, facing a magnet ~~via~~ across a gap~~,~~ ~~a~~ wherein

the brush recess portion ~~formed at the yoke plate to insulate~~ insulates at least one brush; and

the magnet ~~arranged at least~~ is placed at ~~the~~ a yoke portion of the resin bracket ~~portion~~ after the brushes are ~~arranged~~installed; and

a case accommodating the rotor and installed at the resin bracket ~~by inserting a~~, having a concave portion receiving the tip of the resin coated, fixed shaft ~~in a concave portion formed~~ at the center of the case, at least a magnetic path portion of the magnet being ~~formed of~~ a magnetic body.

10. (Amended) The motor as claimed in claim 9, wherein the magnet is separated from the yoke plate by a ~~small~~ gap to enable reflow soldering.

13. (Amended) The motor as claimed in claim 9, wherein the resin of the resin coated, fixed shaft includes potassium titanate whisker and ~~has an anti-thermal feature~~ ~~bearing~~ withstands a thermal deformation temperature of over 200°C (18.5 kgf/cm^2) and ~~a~~ is slippery ~~feature~~.

14. (Amended) A non-circular flat brushless motor comprising:

a metal plate incorporating a shaft support ~~portion~~ at ~~the~~ a center ~~thereof~~, forming a first part of a housing;

a fixed shaft supported by the shaft support ~~portion~~;

a rotor rotatably installed at a tip of the fixed shaft ~~from a tip thereof~~; ~~and~~

a stator ~~formed of~~ including a plurality of armature coils arranged around the fixed shaft to drive the rotor~~,~~; and

~~wherein the other~~ a second part of the housing ~~supports a~~ supporting the tip of the fixed shaft.

16. (Amended) The motor as claimed in claim 14, ~~wherein~~ including a pinion ~~is~~ incorporated in the rotor.

17. (Amended) The motor as claimed in claim 1, wherein the rotor is ~~formed to be~~ eccentric to generate vibrations during rotation.

18. (Amended) The motor as claimed in claim 7, wherein the rotor is ~~formed to be~~ eccentric to generate vibrations during rotation.

19. (Amended) The motor as claimed in claim 9, wherein the rotor is ~~formed to be~~ eccentric to generate vibrations during rotation.

20. (Amended) A method of manufacturing a ~~brush type~~ non-circular flat motor having brushes, the method comprising ~~the steps of~~:

~~press~~ pressing a lead frame having a plurality of yoke plates ~~continuously installed~~ arranged at a predetermined pitch by a connection portion;

inserting the ~~continuously installed~~ yoke plates in an injection mold and ~~integrally~~ molding a resin bracket in the mold;

detaching at least ~~the~~ a connection portion of the yoke plates ~~among the~~ at respective connection portions;

installing the rotor ~~at~~ on a fixed shaft ~~to be capable of~~ for rotating; and

installing ~~the~~ a case.

21. (Amended) The method as claimed in claim ~~32~~ 20, further comprising ~~steps of~~:

fixing brushes to ~~a~~ the resin bracket by ~~a~~ spot welding ~~method~~, the brushes ~~being formed by continuously installing via a plurality of connection portions at~~ having the same pitch as the ~~predetermined pitch~~yoke plates; and

installing a magnet ~~at~~ on the yoke plate.

Amendments to the abstract

Abstract of the Disclosure

A non-circular flat motor in which terminal portions are installed at dead ~~space~~ spaces and a manufacturing method ~~thereof are disclosed~~. ~~Since a flexible sheet type feeder terminal is not adopted, the~~ The motor can be easily held by a transferring apparatus and automatically mounted. ~~Also, the~~The feeder terminal ~~has solderability and~~ is ~~easy to be reflow soldered~~ easily reflow soldered. A rotor and a housing supporting the rotor are ~~formed to be~~ non-circular when ~~viewed~~ in a plane perpendicular to the rotor axis. Feeder terminals or installation terminals are arranged at ~~corner portions at the side~~ corners of surfaces of the housing ~~which are angled and using a circle as an inscribed circle~~. At least one feeder terminal ~~of a high electric potential~~ is insulated from ~~the~~ other

~~portion~~portions of the housing. The ~~corner portion is formed to~~ corners may be concave so that each of the terminals ~~is prevented from protruding outward from~~ does not protrude beyond the housing. Each of the terminals ~~are bent to be~~ is easily reflow-soldered and exposed ~~to~~ at the side of the housing.